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Icequake sources location on Triftgletscher (Switzerland) using different velocity models.

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In the last 15 years Triftgletscher (Bernese Alps, Switzerland) has substantially retreated and a proglacial lake has been formed in the glacier forefield. Because of the glacier retreat, especially the thinning of the lower flat tongue, the stability of the steep section behind it is affected. As a consequence, the likelihood of large ice avalanches with several millions cubic meters releasing from this dangerous area and reaching the new formed lake will increase.

In order to improve the understanding of the mechanisms leading to such instabilities, 8 seismometers were installed in the ice right above the unstable part and a continuous recording of the local seismic activity was carried out from 16th July to 4th August 2010. Considering a set of 214 icequakes, we performed a location of the seismic sources using an homogeneous velocity model where only the ice is considered, a two layers (ice+rock) 1D model, and finally a 3D velocity model including both ice and bedrock precise topographies.
The velocity models are implemented in the software NonLinLoc. Results showed surface, shallow and deep icequakes and could precisely describe the associated uncertainties.

We discussed the sources locations found and compared the results obtained with the different velocity models. We also analyzed the findings with the help of both surface motion and water pressure measurements and tried to link the icequakes locations to the glacier dynamics.